land. Indeed, this feeling appears to have gone so far that all the general questions of the science excite with us scarcely any interest whatever. But a more forward and hopeful spirit appears to have prevailed for some time in other countries, especially Sweden, Germany, and more recently France." Those are the words of despair. I may add that in the same year he resigned his professorship of Mineralogy, and directed his vast energy to the advancement of other subjects.

Now, I think, that a country like our own, which aims at taking and maintaining a high place in the scale of civilisation, ought in some way or other to secure that in every important branch of learning there is a group of men in the country who will make it the main purpose of their lives to render themselves familiar with all that has been and is being discovered in the subject, will do whatever is possible to fill up the gaps in the science, and, last but not least, will make the more important results accessible to other workers for whom so complete and original a survey is impracticable.

No one will doubt that Mineralogy should be such an important branch of learning. Minerals existed before man was thrust upon the scene; they will possibly continue to exist long after he himself has passed away; at least as persistent as himself, they will have an interest for every age.

The continental nations have not only long recognised the importance of mineralogical study, but have acted accordingly. The difference between action and inaction will be most clearly grasped if we compare the position of Mineralogy in Germany with that in this country.

In Freiberg, the centre of a mining district in Saxony, an institute was opened in the year 1766 for the scientific training of those students whose interest was in minerals, and the lectures on Mineralogy given there by Prof. Werner became a prominent feature; of the many pupils of this remarkable man, Von Buch Breithaupt, Haidinger, Humboldt, Mohs, Naumann, and Weiss may be especially mentioned as having afterwards distinguished themselves by their scientific work. Of other Germans, who have likewise gone to their rest after much labour given to the advancement of Mineralogy and Crystallography, we may especially recall Beer, Bischof, Blum, Credner, Hessel, Klaproth, Kobell, Lasaulx, Mitscherlich, Neumann, Pfaff, Plattner, Plücker, Quenstedt, Vom Rath, Reusch, Gustav Rose, Heinrich Rose, Sadebeck, Scheerer, Sartorius von Waltershausen, Websky, and Wöhler. Of the many Germans who are now contributing to our knowledge of minerals it is an invidious task to make a selection, but we may mention Arzruni, Bauer, Beckenkamp, Bücking, Cathrein, Cohen, Goldschmidt, Groth, Haushofer, Hintze, Hirschwald, Klein, Klockmann, Knop, Laspeyres, Lehmann, Liebisch, Lüdecke, Mügge, Osann, Rosenbusch, Sandberger, Streng, Voigt, Weisboch, and Zirkel: most of them are University Professors of Mineralogy; all of them hold important positions as teachers of the subject. Further, the laboratories and instruments available for the teaching of practical work are in many cases, notably at Strassburg, Munich, Göttingen, and Berlin, of an elaborate character.

So much for Germany; let us now look at home. In the Universities of England, Wales, Scotland, and Ireland there is a grand total of—two Professorships of Mineralogy, one of them at Cambridge, the other, and younger one, at Oxford. Further, the stipends are nearly as low as they can be made; in the former case, according to the University Calendar, the stipend paid from the University Chest to the present holder of the office amounts to 300*l.* a year; in the more ancient but less extravagant University of Oxford, the Calendar states that the present professor receives, subject to previous deduction of income-tax, the annual sum of 100*l.*, and the necessary instruments and many of the specimens have presumably been provided from his private resources; in case of residence he is to be allowed another 150*l.* a year for the luxuries which University life involves. And these are the only teaching appointments in his own subject that a successful investigator of minerals can look forward to being a candidate for! The result is that all those students who intend to earn their own living, all those who feel anxious to undertake professorial work, conclude that, however much they may be interested in the investigation of the characters of minerals, they will do well to follow the example of Prof. Whewell and turn to other branches of science in which there is a more hopeful prospect of their studies meeting with practical recognition.

It cannot be expected that advanced Mineralogy will ever be able to command the attention of more than a limited number of students, seeing that its successful pursuit requires a preliminary knowledge of at least three other sciences—mathematics, physics, and chemistry—sciences which must be assigned a fundamental importance in any scheme of education; if geology can be added, so much the better. Only few students can find time in their undergraduate days to acquire a competent knowledge of the preliminary sciences and to proceed afterwards to the study of Mineralogy. But the comparatively flourishing condition of the science in Germany, France, and other countries indicates that this is not a sufficient reason for refraining from giving proper facilities and encouragement to those who wish to enter upon its study. Some years ago the University of Cambridge took a step in the right direction, and introduced Mineralogy into their examinational system in such a way that the students of Physics, Chemistry, and Geology could give time to the acquisition of a knowledge of Crystallography and Mineralogy, and obtain credit for that knowledge in the examination for a degree.

It is clear that if in the future there is to be an honourable rivalry between this and other countries in the advancement of the knowledge of minerals, each of our Universities should be enabled in some way or other to found Professorships of Mineralogy, and be prevailed upon to follow the example of Cambridge in encouraging the students of Physics, Chemistry, and Geology to acquire a knowledge of Crystallography and Mineralogy before their education is regarded as complete. Even where a student has no intention of devoting himself to advanced mineralogical study, an elementary knowledge of Crystallography and Mineralogy will be extremely useful in giving him a better grasp of his own special subject.

And if, perchance, any of you are anxious to reduce the amount of those unmentionable duties of which we have heard so much of late, and feel that you can best do this by the endowment of Professorships of Mineralogy in our Universities, I would advise you not to do what has been so long practicable at this Association, couple Mineralogy with any other science—that would be an unwise economy. Each of the sciences is now so vast in its extent that no professor can be thoroughly master of what has been done, and is now being done, by other workers, in more than one of them. I remember that in my younger days it was held by some at Oxford that the Professor of Mineralogy, a so-called subordinate subject, should continue to be paid on a lower scale than his brother professors, and that he should obtain a living wage by adding a college-tutorship or a lectureship in some other subject to his professorial duties. It is not by the prospect of such appointments that you can expect the most capable men to be attracted to the study of minerals. The practical effect of such an arrangement would only be that a college lecturer would give formal teaching in Mineralogy while devoting his real energy to another subject in which the pupils are more numerous.

It only remains to thank you for the way in which you have listened to a technical address relative to a science for the study of which very few facilities have been offered to you in our own country. Not often does the mineralogist present himself before an audience; he sees only too clearly that

> The applause of listening senates to command,
> To read his history in a nation's eyes,
> His lot forbids;

but I shall not have broken the long silence in vain if I have made clear to you that, though the Science of Mineralogy is itself making great progress, we have hitherto given too little encouragement to its study in our own Universities, and lag far behind both Germany and France in the recognition of its importance.

NOTES.

WE notice with much regret that Dr. C. R. Alder Wright died on July 25, at the early age of forty-nine. He was elected a Fellow of the Royal Society in 1881.

DR. M. FILHOL has been appointed to the chair of Comparative Anatomy in the Paris Muséum d'Histoire Naturelle, in succession to the late Prof. Pouchet.

ACCORDING to a telegram from Prjevalsk (formerly Karakol), a monument to the Russian traveller Prjevalsky has been unveiled there. The monument is built very picturesquely on the slope of the mountains, facing Lake Issyk-kul.

IT is reported that Prof. Brugsch, the eminent Egyptologist, is seriously ill.

MR. CHARLES E. CASSAL, Public Analyst for Kensington and St. George's, Hanover Square, has been elected honorary president of Section VII. (Food) of the forthcoming International Congress of Hygiene and Demography at Budapest.

NEWS of the Wellman Arctic expedition has been received which fortunately confirms the hope, which we expressed when the report of the disaster was received, that the exploring party of the expedition had escaped the initial danger. The *Malygen*, a Norwegian fishing vessel, arrived at Tromsö from Spitzbergen, on August 2, with the captain and three of the crew of the *Ragnvald Jarl* on board. They report that Mr. Wellman landed on May 24, at Walden Island (80° 37′ N.), in the north of Spitzbergen, with 13 men, all in good health, 40 dogs, and provisions for 110 days. Four days later the *Ragnvald Jarl* was crushed in the ice and sank, only part of the stores and equipment being saved. A message was despatched to Mr. Wellman, who was overtaken at Marten's Island, and immediately returned with several members of his party, and after helping to build a house on Walden Island for the shipwrecked crew, set out finally on May 31 for his northern journey. He was heard from on June 17, when Mr. Winship left the advanced party, who were waiting six miles east of Platen Island for open water to form, as the ice was impassable. All were well at that time. This news shows that Mr. Wellman found the conditions of ice-travel harder than he had expected, and since he had spent so much of the best time of the year in travelling so short a distance, there seems little hope that he could have made a great journey northward before the general southward movement of the ice set in, and compelled his retreat to Danes Island. Baron Nordenskjöld telegraphs to the Royal Geographical Society, strongly urging the importance of sending out a supply of provisions, and arranging for the return of the expedition to Europe, should it succeed in regaining Spitzbergen.

THE great Constantine medal of the Russian Geographical Society has been awarded this year to Prof. A. N. Veselovsky, for his thirty-five years' work in the domain of both Russian and West European ancient literature and folk-lore; and the Count Lütke medal to W. E. Fuss, for his many years' investigations of chronometers. It is known that since the splendid researches of Struve into the influence of temperature upon the errors of chronometers, these errors can easily be eliminated; but that changes of moisture still continued to remain a considerable cause of errors, the more so as its action was found to be different on different instruments. In the course of his researches, Fuss made the important discovery that the rate of some chronometers is not modified at all by that cause, and he was able to determine a means of rendering the instruments quite insensible to the influence of moisture. Consequently, all devices which are in use in the navies of Western Europe for isolating the chronometers from the surrounding moisture on board ship, have been abandoned in Russia; and the chronometer determinations are nevertheless quite free from this source of error, as may be seen from the many researches of Fuss, printed in the "Hydrographical Memoirs," published at St. Petersburg. The great gold medals of the different sections of the Geographical Society have been awarded, by the section of Ethnography to M. Karskiy, for researches among the Byelorusses; in Statistics, to a collective work of twenty-two explorers, on the economic conditions of the peasants in the governments of Irkutsk and Yeniseisk; and to Prof. Fortunatoff, for various works, of which his inquiry into the productivity of rye crops in European Russia is the most remarkable. The great silver medal bearing Prjevalsky's name has been awarded to K. N. Rossikoff, for his explorations of the glaciers and physical geography of Caucasus. Small gold medals have been awarded to B. I. Sreznewski, for meteorological work; D. Z. Trofimenko, for cartographic work in Mezen; and to P. S. Popoff, for translations of Chinese manuscripts relative to Mongolia. Several silver and bronze medals have been distributed for various works of less importance.

WE have received from the Imperial Russian Geographical Society a pamphlet by Admiral S. Makaroff, setting forth the desirability of an international agreement with regard to the publication of the materials contained in the meteorological log-books of ships in all parts of the world. Admiral Makaroff has paid some attention to this subject, and as the author of a volume containing the results of observations made during a voyage of exploration round the world, in the Russian frigate *Vitiaz*, in 1886–89, his opinion carries considerable weight. He proposes that original observations should be published by each country in a tabular form, or at least for a period of two years, viz. from January 1, 1882, to January 1, 1884, thus embracing the time during which observations were made by the international Polar expeditions. In the report of a committee appointed to consider certain questions relating to the Meteorological Department of the Board of Trade, and presented to Parliament in 1866, of which Mr. Francis Galton was a member, it was recommended that the results of marine observations should be published on one uniform plan, in the form of tables, for months and seasons. The main difference between these two proposals is that Admiral Makaroff asks for original observations, pointing out that mean data give no exact idea of the daily changes which occur in the condition of the atmosphere. At a conference on maritime meteorology, held in London in 1874, it was also recommended to publish deductions in the form of tables, in addition to charts. Thus, while general opinion favours a tabular, as one form of publication of marine meteorological data, experience of over forty years, since the Maritime Conference held at Brussels, shows that each country is disposed to publish its observations in the form suited to its own requirements, Russia, only, having published a small number of meteorological logs *in extenso*; so that the prospect of any international agreement binding all countries to adopt any special form of publication, however desirable it may be, seems very remote.

THE Midland Union of Natural History and Scientific Societies held their seventeenth annual meeting at Ellesmere, Shropshire, on Friday and Saturday last. The Council met at the Town Hall on Friday afternoon, under the presidency of Mr. W. H. Wilkinson, and eleven delegates from the various societies were present. It was decided that the papers competing for the Darwin medal should be published within the area of the Union, in place of the *Midland Naturalist*, now defunct. The annual meeting was subsequently held in the Museum, when Mr. Brownlow R. C. Tower was elected president for the ensuing year, Mr. Egbert de Hamel was re-elected treasurer, and Prof. Hillhouse (Mason College, Birmingham) and Mr. T. V. Hodgson (of Harborne) were elected secretaries.

PROF. W. C. MACKENZIE, of the Tewfikieh College of Agriculture, Ghizeh, sends us some further particulars with regard to the nitrate-bearing clays of Egypt, described in these columns in May last (vol. l. p. 61). It appears that Messrs. Floyer and Sickenberger have sent in a preliminary report, in which they state that the supply seems to be almost inexhaustible. They consider it to be a "foliated marl, greenish and sometimes reddish, with veins of white gypsum, and incrustations or small crystals of chloride of sodium, and some sulphate of sodium. Its taste is salty and slightly bitter, from the latter.

Its primary stratum has a depth of from 50 metres (Floyer and Seckenberger) to 100 metres (Zittel), and is horizontally bedded between the Lower Londinian, a hard white limestone of the Lower Eocene, and the Suessonian, a yellowish or greyish limestone between the Lower Eocene and the Upper Cretaceous formations." Prof. Mackenzie says that the substance is hard and stony in the deeper regions, and disintegrated near the surface. The compositions of the samples obtained, however, do not give any further information as to the possibility of extracting the nitrate with any hope of commercial success. Fifteen samples were sent to Prof. Mackenzie, and they contained quantities of nitrate varying from 1 per cent. to 17·5 per cent. The average of all would be equal to about 5 per cent. but whether this represents the composition of the mass, is open to question. We understand that a lot of forty tons has been taken to Cairo for extraction, and this will give a better idea as to the possibility of success than can be obtained from the analyses of small samples taken at random from the surface.

WE recently referred to the important studies of M. Marcel Bertrand on the geological structure of the Western Alps. A full account of them, with maps and sections, has now been published in the *Bull. Soc. Géol. France.* The author also describes the lustrous schists of that area, and concludes that they are a "flysch" facies of Triassic age.

IN a somewhat crude paper, entitled "Migration and the Food Quest, a Study in the Peopling of America," contributed to the *American Anthropologist* for July, Mr. Otis Tufton Mason, starting with the simple generalisation that the desire to appease hunger and thirst in the easiest way determines migration, seeks evidence for the primitive peopling of America from the islands of the Indian Ocean. The theory in its main features is probably sound enough, but there are so few facts bearing on the application of the theory to the peopling of America, that the specific question is not much advanced.

DR. F. PLEHN, the German Government medical officer in the Cameroons, has made a special study of the beliefs and customs of the Dualla negroes with respect to illness and death, and he has a paper on the subject in the last number of Danckelmann's *Mittheilungen aus den Deutschen Schutzgebieten.* He finds that, contrary to the custom of most primitive tribes, the magician and medical man have separate functions amongst the Dualla. The magician lives in the bush, only coming to the villages when his services are required, and his duties are practically confined to the discovery of thieves and of people who have used magic in order to produce illness or death. The doctor may be a man or a woman, and the office is usually hereditary, although sometimes a student is initiated on payment of a handsome fee. They have some knowledge of the use of plant products as medicine, but are practically ignorant of surgery.

IN the form of a lecture delivered at the Marine Biological Laboratory of Wood's Holl, Massachusetts, Prof. J. M. Macfarlane describes some very interesting observations on the irrito-contractility of plants. He maintains that, in the animal as in the vegetable kingdom, we have to do with a true contractile tissue. In the higher plants this tissue is made up of cells, each consisting of an irrito-contractile protoplasmic sac enclosing a quantity of sap, each cell being joined to neighbouring cells by protoplasmic processes which pass through minute pores in the common cellulose membrane. Irrito-contractility may be started by stimuli of a mechanical, chemical, thermal, luminous, or electrical nature. The seat of this contractility is unquestionably the vacuolated protoplasm, and not the cell-wall, as held by some observers. The degree of contraction of an organ is proportional to the relative molecular activity of the protoplasm, and to the strength or continuity of the stimulus. Prof. Macfarlane has already shown that in the leaves of *Dionœa* contractility can only be excited by two successive stimuli separated by an interval of time; and he now illustrates his conclusions by the phenomena presented by the closure of the leaves in a number of different plants.

THE Report of the Director of the Aquarium of the U.S. Fish Commission at the Chicago Exhibition (*Bull. U.S. Fish Com.* for 1893, pp. 143–190) is well worthy of perusal by those who are concerned in the management of large aquaria, or who take any general interest in such affairs. It is the record of an ambitious enterprise, fraught with many inherent difficulties; and the frank statement which Prof. S. A. Forbes has given, both of the failures and the successes which attended the efforts of his staff, should be of considerable service in other and future undertakings of a similar kind. The marine aquaria had a capacity of 40,000 galls., and, although the necessary supply of sea-water and marine animals had to be obtained at a distance of nearly a thousand miles, this part of the exhibition gave the greatest satisfaction. The fresh-water aquaria, paradoxically enough, were much more difficult to maintain in good condition, owing to the ravages wrought among the fishes by that well-known fungous pest *Saprolegnia*, the germs of which were found to be abundant in the water supply from Lake Michigan. The precipitation of nocuous matter from the water by the ingenious use of an alum tank, followed by careful filtration, was the principal means by which the disease was kept in check; but the least derangement of the filtering apparatus was immediately followed by a fresh outbreak of the plague. Another equally troublesome pest made its appearance during the hot weather in the form of an Infusorian parasite (*Ichthyophthirius* of Fouquet), which attacked and inflamed the skins of the less hardy fishes, and led to a great mortality. "Young cat-fish died like sheep with the murrain." Special observations on these two unbidden guests are given as appendices to the Director's Report. It may be mentioned, in passing, that Prof. Forbes speaks strongly in favour of the employment of shallow open pools or basins, freely exposed to sun and air, instead of the traditional deep narrow tanks with sides of glass.

A RECENT number of the *British Medical Journal* says "that a large collection of indigenous medicinal plants and drugs, fibres, and cereals has already been made in the Imperial Institute from India and the East. A great many of the Indian drugs have enjoyed a reputation in tropical diseases for the last 2000 years. They are, however, employed in the crude state, generally in combination with metallic and mineral compounds, and do not therefore indicate their individual value as medicines. They have, with a few exceptions, undergone no chemical analysis or pharmacological experimentation, and such researches have not yet been taken up either by Government or by private individuals in India, neither are there facilities or expert knowledge easily procurable for such researches. To submit them to experts in London for proper investigation would be very costly unuer the circumstances. The establishment of a chemical and pharmacological laboratory in connection with the Imperial Institute, under a committee of experts, would be a valuable addition. There are few institutions of the kind where any original researches can be made in London; it will therefore be a very desirable and useful institution for the promotion of science. It may in addition be expected to help towards the discovery of important medicines and products of great dietetic and commercial value. The benefits which would accrue from the institution would be greatly appreciated both by English and Indian contributors to the funds of the Imperial Institute; and it would tend to bring together scientific men from all classes and races of men in the British Empire." It is remarked with regret that though such a project as this has been contemplated by the authorities in charge of the Institute, little more progress has been made in the matter. We cordially agree with our contemporary in thinking the matter important enough to engage the attention of the committee of the Institute, and would urge that the necessary steps for its consideration be taken at the earliest possible date.

DR. J. W. VAN BEBBER, of the Deutsche Seewarte, has examined the daily synoptic weather charts for the North Atlantic Ocean and adjacent continents, issued in connection with the Danish Meteorological Institute, for four years ending November 1887, and has published some useful results obtained from them in the *Annalen der Hydrographie* for June. The tables show the frequency of the occurrence of barometric depressions in the North Atlantic for areas of 10° of longitude and 5° of latitude, and charts give further information graphically. These low pressure areas exhibit an increase of frequency from high northern to middle latitudes, and then a decrease towards low latitudes, so that below the 30th parallel the minima occur very rarely. In the meridianal direction, the barometric minima are most frequent on the eastern coast of North America, and originate less frequently over the ocean. The mean height of the barometer in the areas of low pressure exhibits several peculiarities in different seasons. In spring, the depth of the barometric minima over the whole area is relatively small; to the south of Iceland the barometer frequently falls considerably below twenty-nine inches. In summer the mean height of the barometer, especially on the ocean, is higher than in spring, the lowest readings being generally between Iceland and Greenland, while in autumn and winter the readings over the ocean are considerably lower than in the other seasons. The lowest readings are again found to the south of Iceland, where the mean minima in winter fall below 28·5 inches. With regard to barometric maxima, or areas of high pressure, their movement is mostly towards east and south-east. The regularity of their paths is shown by the charts to be much greater than is usually supposed. The behaviour of stationary maxima is very interesting; there is in all seasons a great frequency of stationary maxima over the ocean between 20° and 40° W. long. and 25° and 40° N. lat. There is also another maximum of frequency in spring and summer between Greenland and Spitzbergen. These stationary maxima exert an important influence over the weather of the British Islands, and the discussion of synoptic charts, such as now undertaken by Dr. van Bebber, is one of the most likely means of improving our knowledge of weather phenomena.

AN account of the performance of the new continuous-record seismometrograph of the Collegio Romano, during 1893 and 1894, was communicated to the Accademia dei Lincei at a recent meeting by Dr. G. Agamennone. The registration was mechanical, and not, as in some modern instruments, photographic. The pendulum for the two horizontal components was 6m. long, and carried a bob weighing 75 kgr. Records were obtained at Rome of the three earthquakes of Zante in 1893, and also of the shocks felt in Samothrace, Aleppo, Servia, and Nikolaïev. On November 5, 1893, the instruments, both at the Collegio Romano and the Rocca di Papa Observatory, registered the violent earthquake proceeding from Turkestan and Northern India. But the most interesting record, reproduced in the author's paper, is that of the Japanese earthquake of March 22, 1894. The disturbances registered at Rome lasted nearly an hour, and showed three main series of shocks, with intervals of comparative quiet between. Towards the close of the earthquake the individual wave-lines became distinctly visible, each wave taking about seventeen seconds to pass. Taking the velocity of propagation of these earth tremors as 2500 metres per second, this would give some 40 km. for the wave-length of this disturbance. These slow undulations began to appear at 11h. 58m., whereas from the beginning of the earthquake at 11h. 37m. 20s. till then the period had been much shorter, and the individual traces overlapped. What is of special importance in this record is the enormous distance—nearly one earth-quadrant—across which the disturbance was propagated.

AT the last meeting of the Société Helvétique des Sciences Naturelles at Lausanne, M. Raoul Pictet gave some particulars concerning cold-burns experienced by himself and his assistants during his investigations of the lowest temperatures attainable. He distinguishes two degrees of burns. In the case of the first, the skin is reddened, and turns blue on the following day. The area of the spot is nearly doubled during the following days, and it is not generally healed till about five or six weeks afterwards. It is accompanied by a very painful itching on the affected spot and the surrounding tissues. When the burning is more serious, produced by a longer contact with the cold body, or by contact rendered perfect by alcohol, ether, or liquid air, a burn of the second degree is experienced. The skin is rapidly detached, and all the parts reached by the cold behave like foreign bodies. A long and stubborn suppuration sets in, which does not seem to accelerate the reconstitution of the tissues. The wounds are always malignant, and scar very slowly and in a manner altogether different from burns produced by fire. When on one occasion M. Pictet had suffered a severe burn on the hand, due to a drop of liquid air, he seriously scorched the same hand accidentally. The scorched portion was healed in ten or twelve days, whereas six months afterwards the wound produced by the cold burn was still open. In order to try the effect of radiation in dry cold air, M. Pictet held his bare arm up to the elbow in a refrigerating vessel maintained at − 105° without touching the metallic walls. He felt over the whole skin and throughout the muscles a sensation which had a distinct character, and could not be described by words. The sensation is not disagreeable at first, but gradually becomes decidedly so, and appears to have its seat in the central bone or the periosteum. After three or four minutes the skin is rather blue, and the pain becomes intense and more deep-seated. On withdrawing the arm from the refrigerator at the end of ten minutes a strong reaction is experienced, accompanied by a superficial inflammation of the skin. This reaction resembles that which takes place after handling snow for some time with bare arms, except that it is more intense.

WHETHER electromagnetic waves are capable of producing mechanical effects on the conductors forming resonators, is a question which has been investigated by different observers, the results obtained being entirely discordant. The current number of *Wiedemann's Annalen* contains a paper, by Herr Lebedew, on the subject, in which he describes a new form of apparatus which he has employed, and with which he finds that these waves can exert mechanical effects on suspended resonators. The electric waves were set up by means of a Lecher wire system twenty-eight metres long; the waves in this system, which damp out with such great rapidity, being used to induce others in a suitably placed vibrator. The magnetic vibrator consists of a piece of zinc, 20 cm. by 65 cm., bent double, so that the distance between the opposite ends, which form the plates of a condenser, could be adjusted, and thus the wave-length of the vibrations produced be varied between 320 cm. and 380 cm. The magnetic resonator consists of a coil of four turns of fine silver wire, with its axis horizontal, and having terminals connected to two electrometer needles, the relative position of which could be adjusted, and thus the "pitch" of the resonator altered. The resonator for showing the effect of the electric component consisted of a coil of fine silver wire with its axis vertical, the two ends being connected to two cylindrical quadrants. In each case the wires, &c., were fixed to a light glass rod, and the whole was suspended by a fine quartz fibre. The author finds that both types of instrument behave in the same manner, and that the effect increases as the pitch of the resonator approaches unison with the vibrator, suddenly changing sign when this point is passed. Thus, when the resonators were tuned higher than the vibrators, they were attracted, while when they were turned lower, they were repelled. The effects of slow changes of potential and electrostatic charges produced thereby did not affect the instruments, since the author found that when the knobs of the induction coil were so far separated that no spark passed, and therefore no electrical oscillations were set up, the resonators were unaffected.

AN interesting contribution to the subject of electrical oscillations and electrical resonance is made in a paper by Mr. John Trowbridge in the current number of the *Philosophical Magazine*. Being desirous of investigating the conditions under which the formulæ given by Kelvin, Stefan, and others for the time of oscillation hold, and considering that method first employed by Spottiswoode of exciting a Ruhmkorff coil, by means of an alternating current dynamo, was a much more powerful method of exciting oscillations than the ordinary method of charging Leyden jars by means of an electrical machine, or working an induction coil by a primary battery, the author has designed a form of apparatus in which he employs an alternator capable of giving a current of from 15 to 25 ampères with a potential difference of 120 volts, together with a suitable transformer to obtain the necessary difference of potential. He, in general, employs one primary circuit between two entirely separate and disconnected secondary circuits, so arranged that the images of the sparks in the three spark-gaps, after reflection in a rotating mirror, could be formed side by side on the same photographic plate. The most striking results obtained by the author are that a unidirectional spark (non-oscillatory) always excites an oscillatory discharge in a secondary circuit if the self-induction, capacity and resistance of this circuit permit an oscillatory movement. In every case the first effect of the exciting unidirectional primary spark is to make the secondary circuit act as if there were no capacity in its circuit, a thread-like spark resulting, which is exactly like that produced when all the capacity in the secondary circuit is removed. After a short interval of time the electricity rushes into the condensers, and begins to oscillate, the strength of the oscillations rising, after one or two vibrations, to a maximum, and then decreasing; the rate of oscillation finally assuming a steady state, and being expressed by the formula $t = 2\pi\sqrt{\mathrm{LC}}$. If a unidirectional primary spark excites oscillations in neighbouring circuits which are slightly out of tune, the phenomenon of electrical beats or interferences can be produced in these circuits, and is very clearly shown on the photographs of the sparks. If the primary spark ceases to be unidirectional, and becomes oscillatory, these oscillations will tend to compel those of the secondary to follow them, and if they are not sufficiently powerful to do this they beat with the secondary oscillations. When all capacity is removed from the secondary circuits they oscillate in tune with the primary circuit. The author has been led to suspect that there is a change in the period of electrical oscillations when an iron wire is substituted for a copper one of the same geometrical form, and is at present engaged in investigating this point.

THE forty-first report of the Department of Science and Art, and the Directory (revised to June 1894), have been issued.

MESSRS. DULAU AND CO., have issued a catalogue of works they have for sale, on astronomy, terrestrial magnetism, and meteorology.

WE have received from the publishers (Messrs. Bliss, Sands, and Foster) the latest volume of their very pretty series, entitled "The Country Month by Month." The number treats of "The Plant-World in August," and "Wild Life" in the pleasant month upon which we have just entered. The series should be a favourite one with lovers of nature, the style of writing in it being bright and chatty, and the general get-up very tasteful.

A REPORT, just received from Mr. Joseph Baxendell, showing the results of observations made in connection with the meteorological department of the Corporation of Southport during 1893, does credit to municipal meteorology. The report includes tables showing the results of routine observations, and also various notes relating to the instruments used and methods employed.

MR. J. D. POTTER has sent us "Twelve Charts of the Tidal Streams of the North Sea and its Coasts," which he has recently published for Mr. F. Howard Collins. The two thousand arrows which are to be found upon the charts represent the direction of the tidal streams of the North Sea and its surrounding coasts at all hours of the tide upon any day of the year. The time of high water at Dover supplies the key. The charts are reduced from the one published by order of the Lords Commissioners of the Admiralty, and numbered 2339.

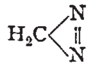
THE first number of *Contributions from the Zoological Laboratory of the University of Pennsylvania* has been received. It contains three articles, as follows, and is illustrated by four plates:—"The Correlations of the Volumes and Surfaces of Organisms," by Dr. J. A. Ryder; "The Growth of *Euglena viridis* when constrained principally to two Dimensions of Space," by Dr. J. A. Ryder; "Descriptions of three new Polychæta from the New Jersey Coast," by J. P. Moore. The new serial is issued through the Pennsylvania Press, Philadelphia.

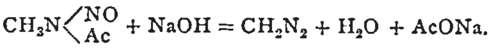
YET another magazine professing to be devoted to science has appeared—*The New Science Review: a Miscellany of Modern Thought and Discovery*. The latest arrival, which will be published quarterly, hails from America, but has an office in Henrietta Street, Covent Garden. Some of the articles in the first number seem to us scarcely to fall under the head of science, but this lapse into other realms may be due to the fact that the magazine aims at originality. Among the articles somewhat more closely allied to science than those we have hinted at, may be mentioned—"The Mystery of the Ice-age and its Solution," by Major-General Drayson; "The Problem of the Pole," by C. Morris; and "Nikola Tesla and his Works," by Lieut. F. J. Patten; while Prof. A. Heilpin contributes "Current Scientific Discussion."

BOTH physical and natural science are fairly represented in the current number of *Science Progress*. Dr. D. H. Scott surveys recent work on the morphology of tissues in the higher plants; St. George Mivart makes some critical remarks on the theories of epigenesis and evolution; and Prof. E. Waymouth Reid describes electromotive phenomena in glands. The arrangement of the molecules in a crystal, forms the subject of an interesting article by Mr. H. A. Miers; and a useful paper on atomic weights is contributed by Mr. Alexander Scott. In the July number of the journal the titles of chemical papers which appeared in May were enumerated. A similar list for June is given in the current issue, and an editorial note informs us that the list will be continued in each number.

THE First Biennial Report, for the years 1892 and 1893, of the Maryland State Weather Service, which was organised on May 1, 1891, has been published. As in other States, the observers are voluntary, and the Weather Bureau supplies instruments, &c. The present report is intended to give a general view of the climate, so far as conclusions can be drawn from data yet obtainable; it also contains a general summary of the physical features of Maryland, and of the different types of soil, each of which is specially adapted to the cultivation of certain classes of plants. The Director of the service, W. B. Clark, points out that the climate is generally what is known as continental, but is greatly modified in the eastern part of the State by the ocean. The average mean temperature of January is 32°·8, and of July 75°·8, a mean range of 43°, but the differences in certain localities are very considerable. Rainfall is fairly equally distributed throughout the year, the maximum occurring in the spring; the mean annual fall is 42·4 inches. Snow never fails completely, even with warmest winters.

THE *Reports of the Director of the Michigan Mining School* for 1890-1892 have just been distributed, and tell of much good work having been accomplished at this popular institution during the years under review. In the report for 1891-92 mention is made of a number of changes which were to come into effect in 1893, one being the lengthening of the course from three to four years, and the raising the age for admittance into the regular course to twenty years, unless the intending student shall have completed a regular course in some good high school or academy. The need of some kind of endowment is pointed out, the school being at present entirely dependent upon legislative aid. The report also calls attention to the necessity for the erection of an additional building on grounds belonging to the school. This building would be used for machine shops, testing and electrical laboratories, the mining engineering laboratories, &c. A metallurgical laboratory is much needed, but cannot at present be proceeded with for want of funds. The work in each department has developed so much that an increased expenditure all round is deemed necessary.

DIAZOMETHANE,  $H_2C\Big\langle\begin{matrix}N\\ \| \\ N\end{matrix}$, has been isolated by Prof. von Pechmann, of Munich, and a preliminary communication concerning it is contributed to the current *Berichte*. This interesting substance is a yellow gas at the ordinary temperature, which condenses when cooled to a yellow liquid. It appears to be odourless, but is extremely poisonous, so much so that Dr. Pechmann finds it very difficult to work with in the gaseous state, owing to its violent action upon the respiratory organs. The principal properties of the substance have therefore been studied with its solution in ether. It is obtained by the action of alkalies under special conditions upon any of the nitrosamines of the type NR . Ac . NO, where R represents an alkyl radical such as methyl, ethyl or benzyl, and Ac stands for acetyl, benzyl, or the radicals $CONH_2$ and $COOC_2H_5$. The yield of the gas is at least fifty per cent. of the theoretical when nitrosomethylbenzamide or nitrosomethylurethane are employed. The reaction appears to be a very simple one, represented by the following equation:—



$$CH_3N\Big\langle\begin{matrix}NO\\Ac\end{matrix} + NaOH = CH_2N_2 + H_2O + AcONa.$$

The new substance behaves in a characteristic manner towards dilute acids. The yellow solution in ether is instantly decolourised upon the addition of the acid at the ordinary temperature, nitrogen being evolved. Water acts in a similar manner and almost as vigorously as when acidified. It is much more stable, however, towards alcohol. Iodine decomposes diazomethane with formation of methylene iodide CH_2I_2 and evolution of nitrogen. The reaction may be carried out volumetrically if the iodine is likewise employed dissolved in ether, the completion being indicated by a sudden decolourisation of the liquid; the nitrogen can readily be measured by means of the nitrometer, over mercury. Diazomethane reacts with silver nitrate and Fehling's solution in a similar manner to the diazoacetic ether described by Curtius. Mercuric oxide is reduced in the cold. Cork is bleached and eventually destroyed by the gas, so that the ethereal solution cannot be preserved in vessels closed with cork stoppers. The best proof of its composition and constitution is considered by Prof. Pechmann to be afforded by its reaction with the methyl ether of fumaric acid. The yellow ethereal solution of diazomethane is instantly decolourised upon admixture with the fumaric methyl ether; the substance produced is a direct addition product which has been obtained in crystals, and which upon boiling with dilute hydrochloric acid evolves carbon dioxide and yields crystals of hydrazine hydrochloride. Moreover, the silver salt of this compound is stable, and has been analysed. In concluding his preliminary notice, Prof. Pechmann states that he has likewise isolated diazoethane in a similar manner, employing, of course, an ethyl instead of a methyl nitrosamine. Further particulars of these compounds will doubtless be awaited with considerable interest.

THE additions to the Zoological Society's Gardens during the past week include a Mozambique Monkey (*Cercopithecus pygerythrus*) from East Africa, presented by Mrs. Keirnander; a Blotched Genet (*Genetta tigrina*) from Lamoo, East Africa, presented by Miss M. Clode; a Grey Ichneumon (*Herpestes griseus*) from India, presented by Miss Sullivan; a Four-horned Sheep (*Ovis aries*, var.) presented by Mr. Frank C. Strick; a Blackcap (*Sylvia atricapilla*) British, presented by Captain John Richardson; a Smooth Snake (*Coronella lævis*) British, presented by Mr. John Gray; a Common Viper (*Vipera berus*) from Scotland, presented by Mr. J. Anderson; a Red and Blue Macaw (*Ara macao*) from South America, deposited.

OUR ASTRONOMICAL COLUMN.

THE MAGNESIUM SPECTRUM AS A CRITERION OF STELLAR TEMPERATURE.—The variations undergone by the spectrum of magnesium when the element is subjected to different temperatures were studied some years ago, and their use in estimating the comparative temperatures of celestial bodies have been pointed out. Prof. J. E. Keeler contributes a note on the matter to the *Astronomische Nachrichten*, No. 3245, his remarks referring especially to some observations recently published by Prof. Scheiner on the behaviour, under different temperatures, of the lines at λ 4482 and λ 4352. The former line is strong and broad in the spectrum of magnesium, when luminosity is produced by means of the electric spark with Leyden jar in the circuit, but it does not appear in the arc spectrum; on the other hand, the line at λ 4352 is strong in the arc spectrum, but faint in the spark spectrum. Similar differences of relative intensity are found to exist in stellar spectra, and Prof. Scheiner is not alone in thinking that they afford a means of estimating the approximate temperatures of the absorptive atmospheres of celestial bodies exhibiting them. In connection with this subject, Prof. Keeler comments upon the absence of the magnesium triplet *b* from the spectrum of Rigel, while the line at λ 4482 is conspicuous. He suggests that the star is at too high a temperature for the production of the *b* group, and uses the relative strength of the group in different spectra as a criterion of stellar temperature. It is pointed out that Kayser and Runge have shown that the group is characteristic of a molecular structure which cannot exist at a very high temperature, whereas the lines at λ 4482 and λ 4352 do not represent the same molecular state. These considerations lead to the conclusion that the aspect of the *b* lines in stellar spectra may be used as an index to the temperature in the same way as the two lines selected by Prof. Scheiner. And since the *b* group is absent from the spectra of Rigel and